

WE CLAIM:

1. A method for simultaneously determining multiple individual chemical concentrations of a liquid stream comprising:

subjecting at least a segment of the stream to ultraviolet light wherein the light penetrates a short distance into the segment and the effective path length of the light is a function of the refractive index of the segment;

generating an ultraviolet absorption spectrum from said ultraviolet penetration of the sample over a wavelength from 190 to 300nm; and

analyzing the ultraviolet absorption spectrum by a regression method to determine the component concentrations of the liquid stream.

2. A method according to claim 1 wherein the sample is subjected to ultraviolet light by an ATR-UV probe.

3. A method according to claim 1 wherein the sample is subjected to ultraviolet light by an ATR Tunnel flow cell.

4. A method according to claim 1 wherein the regression method is multivariate.

5. A method according to claim 4 wherein the multivariate regression method is the partial least squares method.

6. A method according to claim 1 wherein the regression method is linear.

7. A method according to claim 1 wherein the stream is a kraft liquor stream.

8. A method according to claim 7 wherein the measured component concentrations of the kraft liquor are selected from sodium hydroxide, sodium sulfide and sodium carbonate.

9. A method for simultaneously determining the sodium hydroxide, sodium sulfide and sodium carbonate concentrations of a kraft liquor stream comprising:
generating an ATR-UV absorbency spectrum of the liquor over a wavelength from 190 to 300 nm;

analyzing the ultraviolet absorption spectrum by a regression method to determine the component concentrations of the liquor.

10. A method according to claim 9 further comprising controlling operation of a kraft cooking digester, recausticizing unit, white liquor oxidation reactor or chemical recovery furnace in response to the determined chemical concentrations.

11. A system for determining chemical concentrations of a liquid stream comprising:
an ultraviolet spectrometer, a device capable of providing ultraviolet absorption data between 190 and 300 nm, and a multivariate or linear calibration program for analyzing the ultraviolet absorption data.

12. A system according to claim 11 wherein the device is an ATR optical probe.

13. A system according to claim 12 wherein the ATR optical probe is installed in a kraft liquor stream.

14. A system according to claim 11 wherein the device is an ATR tunnel flow cell.

15. A system according to claim 14 wherein the ATR tunnel flow cell is installed in the ultraviolet spectrometer and a kraft liquor stream flows through the ATR tunnel flow cell.

16. A system for determining chemical concentrations of NaOH and Na₂CO₃ in a kraft liquor stream comprising:

an ultraviolet spectrometer,

